

Title: MODELING CONNECTIONS BETWEEN LIFE STAGES AND HABITATS OF PINK SHRIMP IN SOUTH FLORIDA.

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Project Summary: This 2-yr proposal responds to SFP04 CSCOR/COP Announcement of Opportunity Research Area D, which concerns the sustainability of Higher Trophic Level species (HTLs) of widely recognized importance. The proposal addresses scientific questions about pink shrimp (*Farfantepenaeus duorarum*), an ecologically and economically important species with spawning grounds near the Dry Tortugas and nursery grounds in Florida Bay. The proposal addresses needed next steps to expand the scope and improve predictions of a model we have been using to organize pink shrimp research in Florida Bay (Browder et al. 1999, Browder et al. 2002) ([Fig. 1](#)). The model soon will be used to predict ecological effects of planned changes in water management of the Comprehensive Everglades Restoration Project (CERP) and to interpret results of follow-up monitoring.

The pink shrimp was chosen as a basis of performance measures to gauge the restoration and protection of Florida Bay in the ongoing initiative to reconfigure south Florida's water management system because: (1) this species is a major link between the food web base and top consumers, including game fish and wading birds (Schmidt 1986, 1989, Palmer 1962); (2) it supports the multi-million-dollar Tortugas fishery (Sheridan 1996); (3) Tortugas pink shrimp catches and indices of freshwater inputs to Florida Bay are statistically related (Browder 1985, Sheridan 1996); (4) growth and survival of juvenile pink shrimp are influenced by salinity and temperature (Browder et al. 2002); and

(5) databases exist for juveniles in Florida Bay (1984-present), entry of young adults into the Tortugas fishery (1960-present), and postlarval influxes into Florida Bay (2000-present) (Browder et al. 2002). Life history stages of the pink shrimp are spatially separated and linked to Florida Bay, the Atlantic coastal zone, the southwest Florida Shelf, and the southeastern Gulf of Mexico (Criales et al. 2003a). Therefore, the development of scientific knowledge about this species, as well as other HTLs of the Bay, must extend beyond Florida Bay to address the greater ecosystem that includes the processes affecting their movements and transport. The geographical coverage of this new research will allow us to test hypotheses of larval transport and behavior generated by our previous research, clarify the connection between the Dry Tortugas and Florida Bay via the southwest Florida Shelf, determine the pattern of postlarval immigration into the interior Bay, and define environmental and physical factors influencing juvenile pink shrimp density in the Bay. Model refinement and expansion will lead to better predictions of juvenile density as a function of salinity, temperature, habitat, postlarval immigration and settlement, and other interacting, spatially and temporally varying factors.

The strategy of our proposed research, presented in detail in the Objectives, Rationale and Proposed Methodology section, involves: (1) investigation of pink shrimp larval/postlarval transport processes and behaviors, covering Tortugas spawning grounds, the southwestern Florida shelf, and Florida Bay nursery grounds; (2) refinement of the simulation model's core growth and survival module; and (3) development of a landscape framework. Our approach is to first utilize samples and results from previous field studies to test hypotheses and build a clear understanding of the processes, then construct process models that will contribute to the predictions of recruitment of this species and the productive capacity of the Florida Bay ecosystem.

Relevance to
Restoration and/or
Resource
Management:

The pink shrimp simulation model will be used to predict ecological effects of planned changes in water management of CERP.

Geographic Area:

South Florida coastal waters.

Project Status:

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